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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/251,592	02/17/1999	RANDALL W. ROBERTS	19210/106/10	3407

21186 7590 10/27/2003

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

EXAMINER

JACOBSON, TONY M

ART UNIT	PAPER NUMBER
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2644

DATE MAILED: 10/27/2003

16

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/251,592

Applicant(s)

ROBERTS ET AL.

Examiner

Tony M. Jacobson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 July 2003.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 9.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 27 August 2003 has been considered by the examiner.

Drawings

2. The corrected drawings were received on 10 July 2003. These drawings are accepted.

Response to Arguments

3. Applicant's arguments filed 7 July 2003 have been fully considered but they are not persuasive.
4. The arguments are generally unresponsive, written as if the rejections were made against the currently amended claims, rather than the prior claims.
5. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., an active low-pass filter or processing means having an adjustable overshoot adapted to tunably match a measured resonance curve to provide a substantially smooth insertion gain frequency response, in claims 1, 6, and 16; and tuning the frequency response curve of an electronic hearing aid to a measured resonance curve

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of the hearing impaired patient such that the electronic hearing aid provides said hearing impaired patient with a smooth insertion frequency response, in claim 11) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

6. Further regarding the rejection of claim 11 as being anticipated by Miller et al., although Miller et al. state in the abstract that the “hearing aid is permanently adjusted to match prescribed amplification characteristics at predetermined frequencies”, Miller et al. do not specify any particular number of frequencies. As broadly as claimed, “tuning the frequency response curve of an electronic hearing aid to correspond to (with) the measured resonance curve” of a hearing impaired patient is open to many interpretations. For instance, it could be taken to mean perfectly matching a measured resonance curve of a patient (which is not enabled by Applicant’s disclosure); providing a filter having a generally similar response curve, adjusted to match a measured resonance curve at a few critical points; providing a filter having a generally similar response curve, adjusted to minimize the average error (e.g., a least squares fit) in relation to a measured resonance curve; or it could even mean providing a filter having some sort of response curve that compliments a measured resonance curve, as broadly as claimed. Applicant’s disclosure is not enabling for perfectly matching a measured resonance curve at every frequency within the audio range. Also, Miller et al. disclose at column 7, lines 9-50 that a dispensing physician or audiologist performs an

audiological assessment (measurement) of the patent's hearing (which, as indicated at column 1, lines 16-18, includes measuring the real ear unaided response – the acoustical influence of the auditory canal and concha, i.e. the resonance curve of the outer auditory canal); the hearing aid manufacturer processes the assessment data with a known prescription algorithm to determine desired amplification characteristics at predetermined frequencies; and an iterative least squares fit procedure is used to calculate the settings required to best match the frequency response of the hearing aid to prescribed requirements. While the diagram of Fig. 2 shows a response having sharp corners and perfectly straight segments, one of ordinary skill in the art would recognize that this is an asymptotic approximation to a real filter response, which would have rounded corners or possible peaks ("overshoot") at the corners depending on the filter damping factors, or equivalently, the quality factors "Q" of the filter. (See column 7, lines 59-66.)

Response to Amendment

7. The amendments filed 7 July 2003 are accepted and have been entered. The objection to the disclosure made in the prior Office action is withdrawn in response to Applicant's amendment of the paragraph beginning at page 9, line 11.

8. In response to the amendments presently made to claims 1-6, 11, and 16, rejections of these claims and all dependent claims on new grounds follow.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 1, 6, 11, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ribic (US 5,263,089) in view of Sogn et al. (US 5,243,662) and Northeved et al. (US 5,044,373).

11. Regarding claims 1 and 6, as stated in the previous Office action, Ribic discloses in Fig. 1, a device for use in assisting a hearing impaired patient (a hearing aid) having a microphone (1), a preamp (2), and an output amplifier (4), comprising an active low-pass filter (3) (see column 1, lines 49-55) responsively coupled between the preamplifier and the output amplifier, having an adjustable overshoot (column 3, line 66 through column 4, line 2 and Fig. 4c). Ribic does not disclose a distinct signal processing stage preceding the filter. As broadly as disclosed and claimed, a signal processing stage could include the active low-pass filter of the present invention. The arbitrary partitioning of the present invention to distinguish the active low-pass filter from other unspecified signal processing functions does not constitute novelty. Ribic does not disclose that the active low-pass filter with adjustable overshoot is adapted to tunably match a measured resonance curve to provide a substantially smooth insertion gain frequency response. Sogn et al. disclose an electrodynamic sound generator for

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hearing aids (a hearing aid receiver) that provides an underdamped low-pass response curve with a peak ("overshoot") at the corner frequency in the range of 2-kHz to 4-kHz, as illustrated in Fig. 3, to compensate for the loss of the natural resonance of the ear canal in this frequency range, due to the closure of the ear canal by insertion of a hearing aid (column 1, lines 37-67). Sogn et al. utilize mechanical-acoustical filtering means to achieve the desired response curve. Northeved et al. disclose a method and apparatus for fitting of a hearing aid in which the requirement for measuring and recreating the resonance of the auditory canal is further recognized and addressed. Fig. 4 of Northeved et al. illustrates an aided response that, in comparison to the unaided open-ear response, provides a substantially smooth insertion gain frequency response. It would have been obvious to one of ordinary skill in the art at the time the present invention was made to adjust the peak ("overshoot") in the response of the low-pass filter of Ribic to match a measured resonance curve of a hearing-impaired patient in order to simulate the natural resonance of the auditory canal which would be lost upon insertion of the hearing aid, in order to provide a substantially smooth insertion gain frequency response, according to the teachings of Sogn et al. and Northeved et al.

12. Regarding claim 11, the fitting of the hearing aid of Ribic, modified according to the teachings of Sogn et al. and Northeved et al. as described above regarding claims 1 and 6, comprises tuning the frequency response curve of an electronic hearing aid to a measured resonance curve of a hearing-impaired patient such that the electronic hearing aid provides said hearing-impaired patient with a smooth insertion frequency response (Northeved et al. column 1, lines 10-44).

13. Regarding claim 16, as stated in the prior Office action, the hearing aid apparatus disclosed in Fig. 1 of Ribic comprises means (microphone 1) for converting an acoustic signal into an electric signal; means (3) responsively coupled to the converting means for adjustably processing the electrical signal to produce a desired frequency response; and means responsively coupled to the processing means for amplifying the processed signal. Ribic does not disclose that the processing means having an adjustable overshoot is adapted to tunably match a measured resonance curve to provide a substantially smooth insertion gain frequency response. Sogn et al. disclose an electrodynamic sound generator for hearing aids (a hearing aid receiver) that provides an underdamped low-pass response curve with a peak ("overshoot") at the corner frequency in the range of 2-kHz to 4-kHz, as illustrated in Fig. 3, to compensate for the loss of the natural resonance of the ear canal in this frequency range, due to the closure of the ear canal by insertion of a hearing aid (column 1, lines 37-67). Sogn et al. utilize mechanical-acoustical filtering means to achieve the desired response curve.

Northeved et al. disclose a method and apparatus for fitting of a hearing aid, in which the requirement for measuring and recreating the resonance of the auditory canal is further recognized and addressed. Fig. 4 of Northeved et al. illustrates an aided response that, in comparison to the unaided open-ear response, provides a substantially smooth insertion gain frequency response. It would have been obvious to one of ordinary skill in the art at the time the present invention was made to adjust the peak ("overshoot") in the response of the low-pass filter of Ribic to match a measured resonance curve of a hearing-impaired patient in order to simulate the natural resonance of the auditory canal which would be lost upon insertion of the hearing aid, in order to provide a substantially smooth insertion gain frequency response, according to the teachings of Sogn et al. and Northeved et al.

14. Claims 2-5, 7-10, 12-15 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ribic (US 5,263,089) in view of Sogn et al. (US 5,243,662) and Northeved et al. (US 5,044,373) as applied to claims 1, 6, and 16 above, and further in view of Killion (US 4,689,819).

15. Regarding claims 2, 7, 12, and 17, none of Ribic, Sogn et al., nor Northeved et al. disclose or teach a Class-D output amplifier. Killion discloses generally, a Class-D hearing aid amplifier to provide low distortion and low battery drain. It would have been obvious to one of ordinary skill in the art to combine the Class-D power amplifier disclosed by Killion with the active low-pass filter of Ribic, with the peak ("overshoot") in

the response of the low-pass filter of Ribic, adjusted to match a measured resonance curve of a hearing-impaired patient, according to the teachings of Sogn et al. and Northeved et al. in order to provide a hearing aid that is energy-efficient, has low distortion, and a substantially smooth insertion gain frequency response that simulates the natural resonance of the ear canal.

16. Regarding claim 3, the hearing aid of Ribic, modified according to the teachings of Sogn et al. and Northeved et al. and combined with the Class-D output amplifier of Killion would not explicitly include a buffer amplifier stage responsively coupled between the active low-pass filter and the output amplifier. Official notice is taken that the use of buffer amplifiers to match impedances between successive stages is notoriously well-known in the art. It would have been obvious to one of ordinary skill in the art at the time the present invention was made to include buffer stages wherever needed to provide impedance matching between stages.


17. Regarding claim 4, as described above regarding claim 1, in the hearing aid of Ribic, modified according to the teachings of Sogn et al., Northeved et al., and Killion, the resonance of the auditory canal of a hearing-impaired patient is measured to be matched by the response of a low-pass filter having an adjustable overshoot.

18. Regarding claims 5, 8-10, 15, 19, and 20, the active low-pass filter disclosed by Ribic, modified according to the teachings of Sogn et al., Northeved et al., and Killion, comprises a variable resistor to provide an adjustable peak overshoot frequency which is adjusted to tune the frequency response curve of the hearing aid to a measured resonance curve of a hearing-impaired patient, as suggested at column 2, lines 25-29 of Ribic in view of the general teachings of Sogn et al. and Northeved et al.

19. Regarding claims 13 and 18, the processing means of the hearing aid disclosed by Ribic, modified according to the teachings of Sogn et al., Northeved et al., and Killion as described above, comprises an active low-pass filter responsively coupled to the class-D amplifier.

Conclusion

20. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


FORESTER W. ISEN
SUPERVISOR/PATENT EXAMINER
TECHNOLOGY CENTER 2600

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony M. Jacobson whose telephone number is (703) 305-5532. The examiner can normally be reached on Mon. -Fri. 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Forester W. Isen can be reached on (703) 305-4386. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4750.

tmj
October 14, 2003